

REMARKS

Review and reconsideration of the final Office Action mailed October 6, 2011 (hereinafter "Office Action"), is respectfully requested in view of the arguments made herein. No fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency or credit any surplus to Deposit Account No. 04-1679.

In the Office Action, claims 1-24 were pending, with claims 1, 3, 4 and 25 being drawn to an elected invention. All elected claims were rejected under one or more of 35 U.S.C. §102(b), 35 U.S.C. §103(a) or 35 U.S.C. §112, first paragraph. By this Amendment, claim 1 is amended. Support for the subject matter of the amended claims can be found throughout the specification. *See, e.g.*, Page 9, lines 13-15 and original claim 2.

The amendments presented herein have been made solely to expedite prosecution of the instant application to allowance and should not be construed as an indication of Applicant's agreement with or acquiescence to the Examiner's position. Accordingly, Applicant expressly maintains the right to pursue broader subject matter through subsequent amendments, continuation or divisional applications, reexamination or reissue proceedings, and all other available means. The rejections and responses thereto are set forth fully below.

Claim Rejections – 35 USC § 112, First Paragraph

Claims 1, 3-4 and 25 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Applicant respectfully submits that amended claim 1 overcomes this rejection. Accordingly, Applicant respectfully requests that the rejections based on 35 U.S.C. § 112, second paragraph, be withdrawn.

Claim Rejections – 35 USC §§ 102, 103(a)

In the Office Action, claims 1, 3-4 and 25 were rejected under 35 U.S.C. §102(b) as anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,360,547 by Cockett *et al.* (hereinafter "Cockett"). As set forth in amended claim 1, the claimed hydrotalcite-like substance is drawn to:

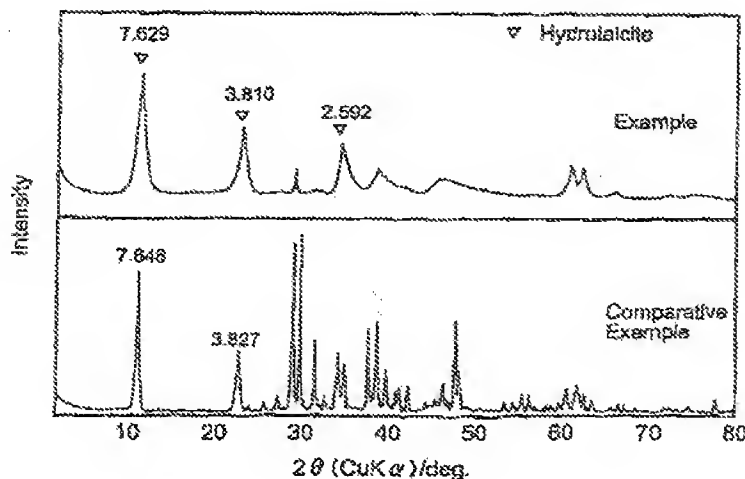
1. (Currently amended) A hydrotalcite-like substance prepared by a process comprising:
mixing an acidic solution containing aluminum ions and magnesium ions and an alkaline solution containing alkali; and
subjecting the mixture to water removal or neutralization immediately upon completion of the mixing of the acidic solution and the alkaline solution; ~~without ageing~~, wherein said hydrotalcite-like substance has an average [[a]] crystallite size of ~~9.5~~ 10 nm or less.

Of particular interest, the claimed hydrotalcite-like substance is produced by mixing an acidic solution containing aluminum ions, magnesium ions and an alkaline solution containing alkali. The mixture is then subjected to water removal or neutralization *immediately upon completion of the mixing of the acidic solution and the alkaline solution*. The hydrotalcite-like substance has an average a crystallite size of 10 nm or less.

As explained in the Specification, the hydrotalcite-like substance recited in amended Claim 1 is advantageous both because it can be manufactured quickly without an aging process or a milling process and because it exhibits properties that are far superior to hydrotalcite-like substances produced using conventional methods. *See, e.g.*, Specification, Pages 12-17 (referring to Figures 2-7). It is believed that these superior properties are the result of physical differences between the claimed hydrotalcite-like substances and the prior art materials.

For example, Figure 2 shows that the claimed hydrotalcite-like substances that are subjected to “water removal or neutralization immediately upon completion of the mixing of the acidic solution and the alkaline solution” have substantially fewer impurities than commercially available hydrotalcite-like substances. *See, below*.

FIG.2

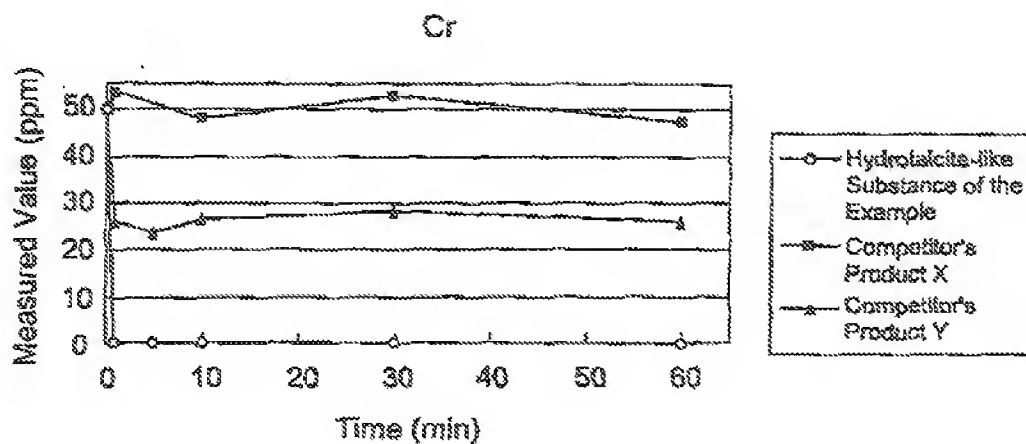


As discussed in the specification:

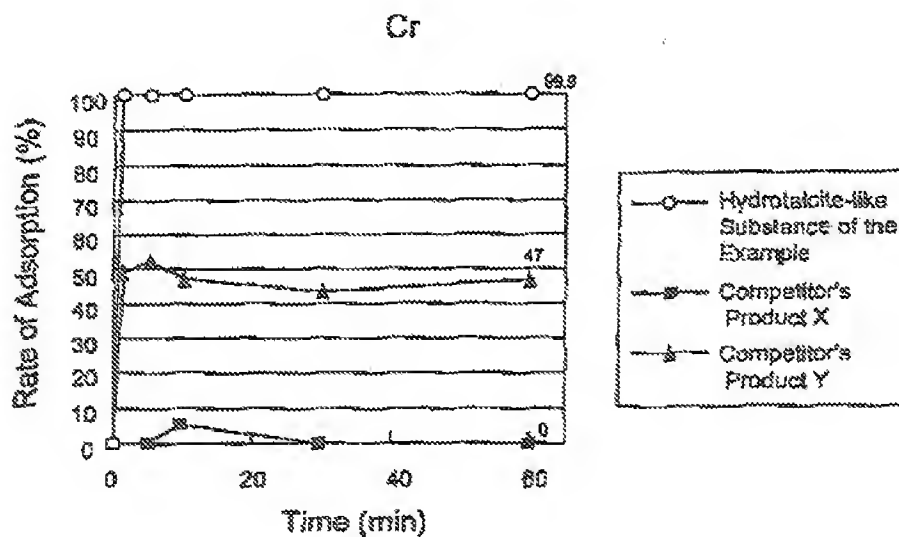
[I]t has been confirmed that according to the hydrotalcite-like substance produced by the method of the present invention, there can be obtained a hydrotalcite-like substance of substantially constant quality, regardless of which specific aluminum and/or magnesium sources are used. This is attributed to the fact that the quantity of the impurities mixed at the time of crystal growth is decreased due to the ageing being not performed, as is shown in the above-mentioned data, and the impurities in the solutions are separated from the hydrotalcite-like substance together with water at the time of water removing process.

Specification, Page 12, ln. 18-25.

In addition, the Specification demonstrates that the claimed hydrotalcite-like substances have substantially improved absorption properties – both quantity and rate - compared to commercially available hydrotalcite-like substances. See Specification, Page 13, ln. 16 – Page 15, ln. 8. The dramatic difference is clearly shown in Figures 4-6 (below).

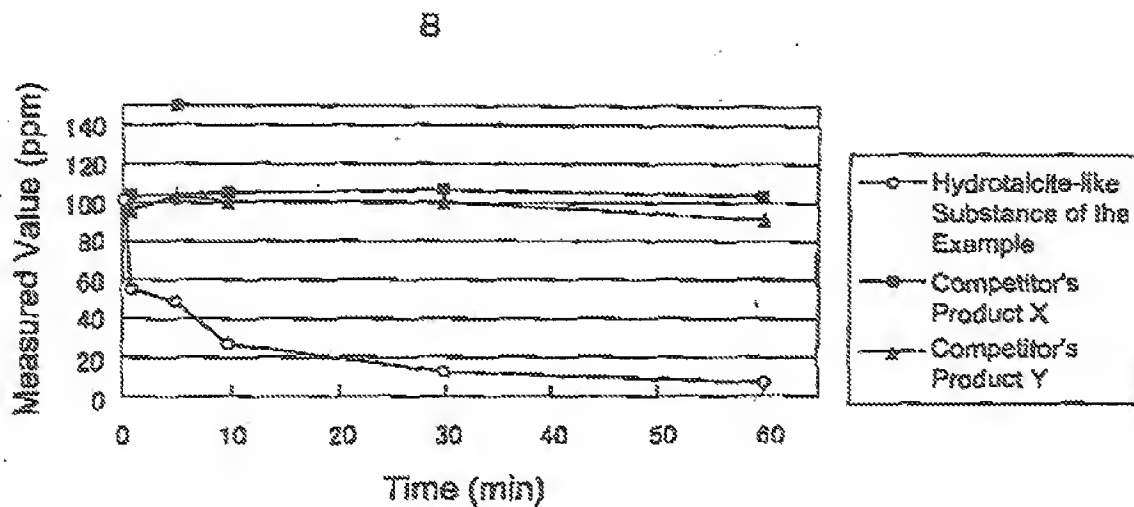


(A)

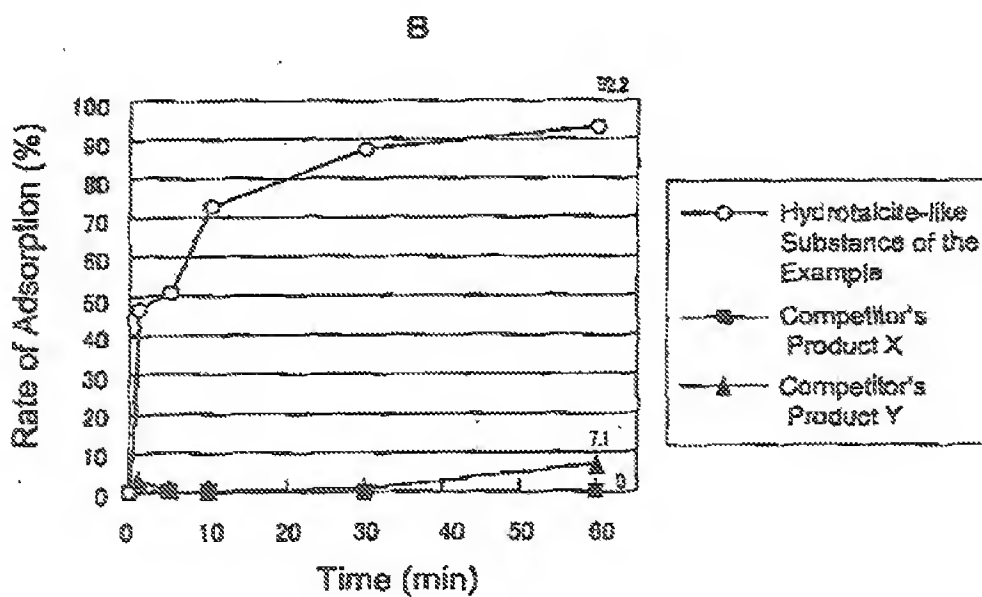


(B)

Figure 4



(A)



(B)

Figure 5

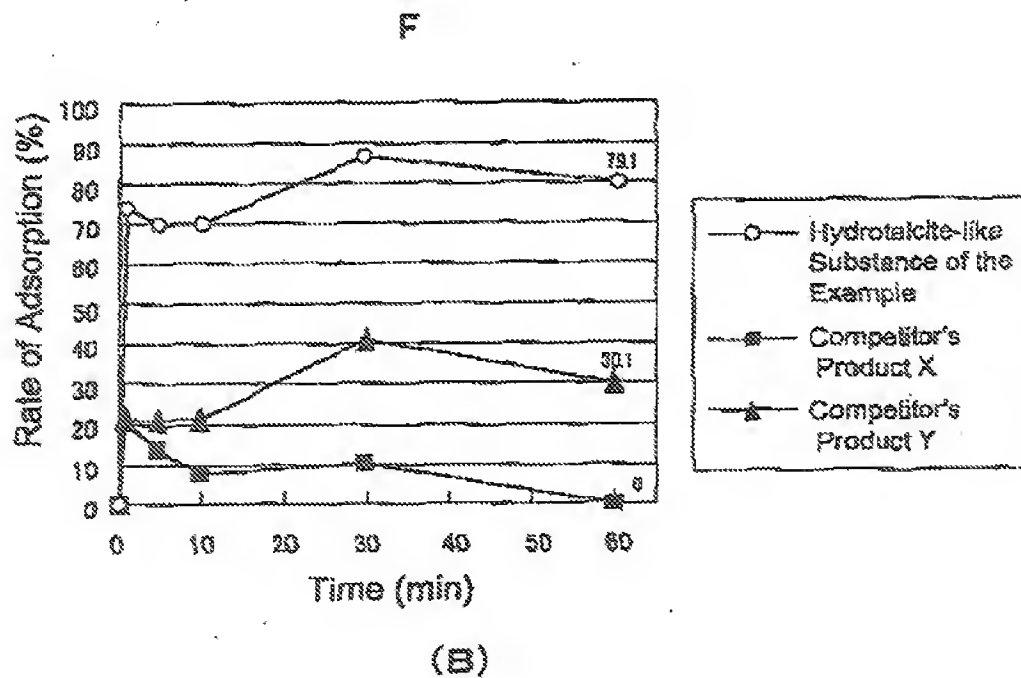
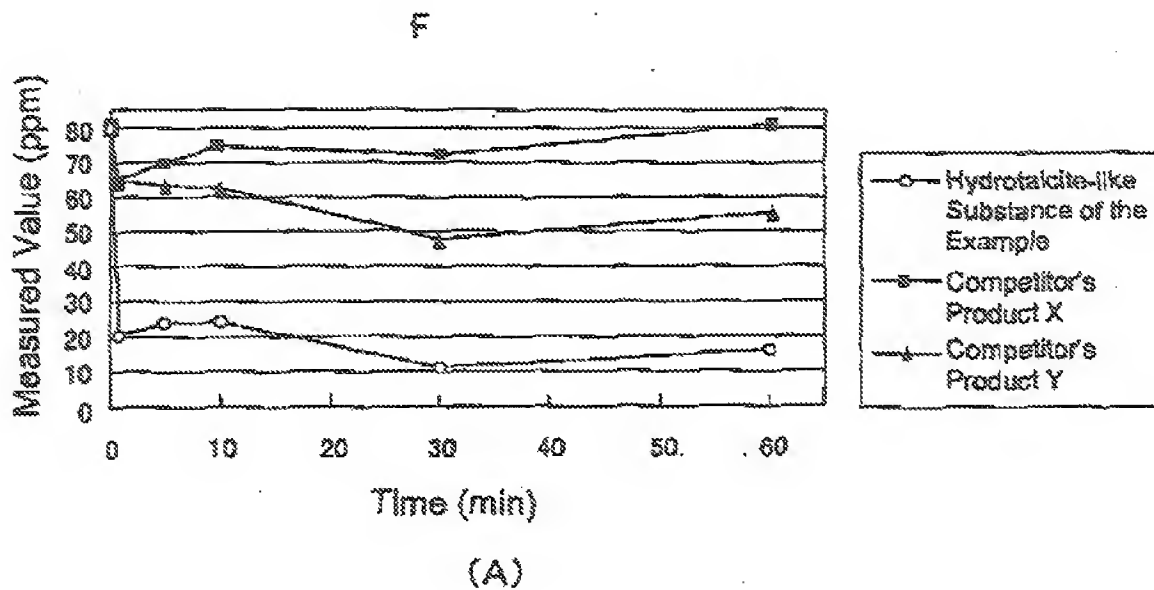


Figure 6

After discussing Figures 4-6, the Specification summarizes the results as follows:

As is apparent from the foregoing, it was proved that the hydrotalcite-like substance of the example has a remarkable adsorption effect beyond the effect by ion selectivity against any anion including boron ions as compared with the conventional hydrotalcite products that have been marketed in the past. This is attributed to the synergistic effect of the following two conditions: one is the crystalline size of the hydrotalcite-like substance being as small as in the nano order; the other is the large basal spacing. Owing to the effect, incomparable anion and cation adsorption capacities can be obtained.

Specification, Page 15, ln. 1-8.

These results demonstrate both (i) that the claimed hydrotalcite is structurally different from commercially available hydrotalcite-like materials, such as those utilized by Cockett, and (ii) that these differences in structure result in unexpectedly improved ion-absorption properties.

Cockett teaches, in Table 1, a hydrotalcite-like substance prepared without aging, and having a crystallite size 50 Å (= 5 nm). However, Cockett discloses that the hydrotalcite-like substance is milled to form a fine powder. See, e.g., Cockett, Claim 22 and Col. 13, line 60. Moreover, Cockett fails to disclose any specific unaging method, and neither discloses nor suggests “subjecting the mixture to water removal or neutralization *immediately upon completion of the mixing of the acidic solution and the alkaline solution*.” Rather, Cockett indicates that the “first portion was left unaged at pH 6.5-7” and that after the second and third portions were aged for 6 hours the “solid was then removed from all three portions.” *Id.*, at Col. 21, ln. 17-22. Furthermore, Cockett heated the mixed solution at 90°C to 100°C for 2 hours as disclosed in lines 60 and 61, column 13, and discloses that “the hydrotalcite-like material contains magnesium and aluminium and the pH of the liquid medium is at least 9” in Claim 17. In contrast to Cockett, which refers to aging only if the pH is elevated, the claims specifically require “water removal or neutralization *immediately upon completion of the mixing of the acidic solution and the alkaline solution*.” This is neither disclosed nor suggested by Cockett.

Accordingly, Cockett does not stop aging the hydrotalcite-like substance, which means (1) the step of milling is absolutely essential for preparing the hydrotalcite-like substance having the crystallite size within the range of the claim of the present application, and (2) the structure of the resulting hydrotalcite-like substance is different (e.g., impurities and absorption).

Meanwhile, as for the crystalline size of the hydrotalcite-like substance of Zhao pointed out by the Examiner in the previous Office Action, Zhao discloses that only in the case of Mg_4Al (constant-pH method), the hydrotalcite-like substance has a crystallite size of 10 nm or less, *i.e.*, 9.6 nm, as shown in Table 1. The other hydrotalcite-like substances containing magnesium and aluminum of Zhao have crystallite sizes of more than 10 nm, and the maximum crystalline size is 30.9 nm. Therefore, Zhao cannot control the crystalline sizes of the hydrotalcite-like substances containing magnesium and aluminum to be 10 nm or less.

In contrast, the present invention as set forth in amended claim 1 is directed to "A hydrotalcite-like substance prepared by a process comprising: mixing an acidic solution containing aluminum ions and magnesium ions and an alkaline solution containing alkali; and subjecting the mixture to water removal or neutralization immediately upon completion of the mixing of the acidic solution and the alkaline solution". The hydrotalcite-like substance recited in amended claim 1 has the very small average crystallite size, *i.e.*, 10 nm or less, even without a process of milling because it is prepared without the ageing process to inhibit the growth of the crystal. Additionally, the hydrotalcite-like substance recited in amended claim 1 has an advantage that mass production can be easily achieved in a short time due to without aging process. Accordingly, Applicant respectfully requests that the anticipation and obviousness rejections based on Cockett be withdrawn.

Even if, despite the foregoing arguments, the Examiner maintains that a *prima facie* case of obviousness has been established, Applicant respectfully submits that the claimed hydrotalcite-like substance possesses structural properties and exhibits unexpected results that are not disclosed or suggested by the cited references. The Federal Circuit has held that, "Obviousness cannot be predicated on what is not known at the time an invention is made, even if the inherency of a certain feature is later established." *In re Rijckaert*, 9 F.2d 1531 (Fed. Cir. 1993). With respect to the synergistic results of the claimed mixture, *In re Chupp*, 816 F.2d 643 (Fed. Cir. 1987) is particularly relevant. In *In re Chupp*, The Federal Circuit held that evidence that a compound or composition possesses superior and unexpected properties in one of a

spectrum of common properties can be sufficient to rebut a *prima facie* case of obviousness, see *In re Chupp*, 816 F.2d 643, 646 (Fed. Cir. 1987); MPEP 716.02(a).II. & MPEP 2145.

In *In re Chupp*, the claims at issue were drawn to a compound for use as a selective herbicide with unexpectedly superior herbicidal efficacy for soybeans and corn, but average herbicidal results for other crops, *see id.* at 644. The prior art was a homolog of the claimed compound that differed from the claimed compound by a single ethylene group (C=C), and was disclosed as being a selective herbicide for crops generally. Thus, the difference between the claimed compound and the prior art was a single methylene group and an unexpected improvement in herbicidal efficacy that was limited to two crops.

The Court noted that the claimed compound's "superior activity in corn and soybeans is a new and unexpected property," *In re Chupp*, 816 F.2d at 645. The Commissioner argued that the claimed compound was similar to the prior art and provided average selective herbicidal activity for many crops and poor herbicidal activity for others. *The Federal Circuit responded to this argument by concluding that the fact that a compound or composition possesses superior and unexpected properties in one of a spectrum of common properties was sufficient to rebut a prima facie case of obviousness, see id.* at 646.

As explained above, the claimed hydrotalcite-like substances exhibit substantially improved absorption properties and absorptions rates compared to commercially available hydrotalcite-like substances. The reason for this may be related to the substantially reduced level of contaminants also discussed above.

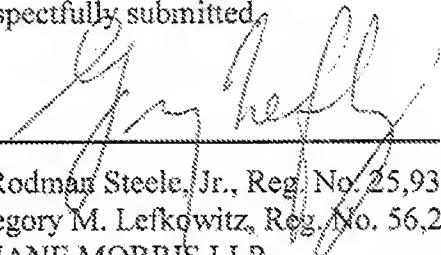
Much like the "superior activity in corn and soybeans [was] a new and unexpected property," *In re Chupp*, 816 F.2d at 645, the unexpectedly improved absorption properties of the claimed hydrotalcite-like substances is a new and unexpected property. Thus, though Application submits that no such case has been established for the reasons previously discussed, Applicant respectfully submits that the unexpected results described herein overcome any *prima facie* case of obviousness that may be established by Cockett. In view of at least the foregoing, Applicant respectfully requests that all rejections based on Cockett be withdrawn.

Conclusion

For at least the reasons set forth above, the independent claims are believed to be allowable. In addition, the dependent claims are believed to be allowable due to their dependence on an allowable base claim and for further features recited therein. The application is believed to be in condition for immediate allowance. If any issues remain outstanding, Applicant invites the Examiner to call the undersigned Greg Lefkowitz (direct line 561-962-2110) if it is believed that a telephone interview would expedite the prosecution of the application to an allowance.

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Respectfully submitted,



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